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view expressed by EULER that the formaldehyde exists mainly in combination, and show why EWART was able to extract formaldehyde from chlorophyll.

BERTHELOT and GAUDECHON[8] have accomplished some most interesting syntheses and decompositions of chemical compounds by means of the mercury vapor lamp, ich in ultra-violet. All the results indicate the existence of balances in the reactions. Water was synthesized from $H_2$ and $O_2$ and decomposed into these elements. Mixtures of CO and $O_2$ exposed to the ultra-violet produced considerable $CO_2$. $CO_2$ thus exposed gave a slight amount of CO and $O_2$. If phosphorus were also present with the $CO_2$, a much greater yield of CO resulted, due to the removal of $O_2$ by phosphorus. If a mixture of $CO_2$ and $H_2$ were exposed to the light, considerable formaldehyde resulted. Mixtures of CO and $H_2$ thus exposed produced considerable formaldehyde. Formaldehyde was decomposed into CO, $CO_2$, $H_2$, and $CH_4$. These results certainly show great possibility in photosynthesis, as the authors use the term, meaning any synthesis by light.

The work suggests the possibility of chlorophyll functioning by transforming the long rays of the red and blue to short ultra-violet rays, which are more effective chemically. This conclusion, however, one should not accept too readily, for GIBSON, working with the leaf, and LÖB, with the effect of silent electrical discharges on solutions of carbonic acid, have shown the possibility of another conception, namely, that the leaf transforms the absorbed light to electricity, which accomplishes the reduction of the carbonic acid to formaldehyde and perhaps the condensation of the latter to sugars. Neither conception is by any means proved; either, however, explains the peculiar fact that red rays (generally ineffective chemically) are very effective in photosynthesis.—WILLIAM CROCKER.

**Digestion of sugars.**—The tendency to consider enzymes as specific in their activity, and the desire to distinguish enzymes already known and to discover new ones, have often distracted the attention from the more interesting problems in general physiology regarding enzymes. Such a problem is the relation between the enzymes produced by an organism and the utilization of the different substances on which it is able to nourish itself. From this point of view COLIN[9] makes a comprehensive study of the enzyme activities of the mold *Botrytis cinerea* in the group of sugars. The mold was cultivated on various polyoses, and a study made of the transformations in each case. The enzymes in the culture liquid and mycelium after growth on each sugar was then studied. This was followed by an investigation of the relation which exists between the polyose sugars in general and the enzymes produced by the mold. The mold grew well and showed little morphological variation on

[8] BERTHELOT et GAUDECHON, Compt. Rend. Acad. Sci. **150**:1690–1693. 1910.

[9] COLIN, H., Hydrolyses de quelques polysaccharides par C *Botrytis cinerea*. Ann. Sci. Nat. Bot. **13**:1–111. 1911.

a large number of polyoses. It elaborates various enzymes corresponding to each of these sugars; thus the mycelium thriving on glucose contains sucrase, maltase, etc. A given polyose, therefore, is not indispensable.

The sugar enzymes of *Botrytis cinerea* present two distinct types, based upon diffusibility: the invertase type, perfectly diffusible, and the maltase type, strongly adhering to the pulp. The invertase type includes those enzymes which effect the partial hydrolysis of raffinose, melezitose, gentianose, and stachyose. It is necessary to add emulsin for complete inversion. The enzymes analogous to maltase are lactase, trehalase, melibiase, and in general, those which achieve the complete inversion of trisaccharides and mannieotetrose. The cultures may thus be divided into two corresponding types. The invertase type is characterized by the presence of both the hydrolytic products and the corresponding enzyme in the culture liquid. The maltase type is characterized by the absence of enzyme and hydrolytic products in the liquid. It is necessary to powder the mycelium in order to demonstrate the presence of the enzymes of this type. The type of culture on maltase is very much more general in the case of *Botrytis cinerea*. The cultures on trisaccharides show successively both of the above aspects.

The author draws the following conclusions regarding the specificity of the sugar enzymes of *Botrytis cinerea:* invertase acts as a levulo-polyose, in respect to sucrose, raffinose, gentianose, and stachyose; it produces levulose from each of these sugars either by total or partial hydrolysis; he was unable to characterize a melezitase different from invertase; maltase and lactase are two distinct enzymes; the hydrolysis of trehalose is brought about by an enzyme closely related to maltase; emulsin effects the hydrolysis of gentiobiose; melibiase is clearly distinguished from emulsin, the author being unable to separate it from lactose; it was impossible to identify turanase and manninotriase with emulsin; from the evidence furnished by *Botrytis cinerea* there is no reason to distinguish them from maltase or lactase.—CHAS. O. APPLEMAN.

**Permeability.**—In continuing his studies upon modified permeability, CZAPEK[10] reports some most interesting results on the relation between surface tension and modified permeability as brought about by certain aqueous solutions. Various workers have shown a marked agreement between the surface tension and the physiological effect of aqueous solutions of certain non-electrolytes. Passing up the series of mono-alcohols, each succeeding member is (on mol. basis) about three times as effective as the member below it in reducing surface tension of an aqueous solution and in producing certain physiological effects. FÜHNER and NEWBAUER[11] have shown for the mono-alcohols, esters, and urethanes that aqueous solutions of equal surface tension produce equal

[10] CZAPEK, F., Ueber die Oberflachenspannung und den Lipoid gehalt der Plasmahaut in lebender Pflanzenzellen. Ber. Deutsch. Bot. Gesell. **28**:480–487. 1910.

[11] Archiv. Exp. Path. u. Pharm. **56**:333–345. 1910.